STATUS LETTER

Applicant : David R. Muhlbaier
Appl. No. : 09/324,700
Filed : June 2, 1999
Title : Formation of Subsurface Barriers in Soil

Art Unit : 3671
Examiner : Alexandra K. Pechhold

Docket No. : 99-1802

Honorable Commissioner of Patents
Washington, DC 20231

Sirs:
The enclosed information is in response to Office Action dated April 21, 2003 for the subject application. Accordingly, applicant cancels the previous response and new matter in the response dated Sept. 27, 2002 and resubmits the application as a Continuation In Part. The CIP is entitled "Preferential Fracturing Of Soil And Material Implantation".

Below is a listing of the contents of this package.

1. Forms
    a. Certificate of Mailing (PTO/SB/92)
    b. Utility Patent Application Transmittal (PTO/SB/05), 1 page
    c. Transmittal Fee (PTO/SB/17)
    d. Credit Card Payment Form (PTO/2038), 1 Page
    e. Declaration for Utility of Design Application (PTO/SB/01), 2 pages
    f. Post card (one)
2. Status Letter (1 page)
3. Response to Examiners Comments (3 pages)
4. Patent Application as a Continuation In Part (23 pages plus 5 sheets of drawings)

Sincerely,

David R Muhlbaier 7/14/03.

David R Muhlbaier

Response to Examiners Comments

Applicant : David R. Muhlbaier 7/16/03
Appl. No. : 09/324,700
Filed : June 2, 1999
Title : Formation of Subsurface Barriers in Soil

Art Unit : 3671
Examiner : Alexandra K. Pechhold

Docket No. : 99-1802

Honorable Commissioner of Patents
Washington, DC 20231

Sirs:
In response to the Office Action of April 21, 2003 for the subject patent application, please note the following response to the examiners comments denoted by item numbers.

Item 1. Applicant requests cancellation of the response to previous office action, which was submitted on September 27, 2002. That response resulted in extensive reorganization of the application, which was then considered new matter. There was no intention to add new information. The new application has been simplified and is now being resubmitted as a Continuation-In-Part.

Item 2. Information received, see Item 1.

Item 3. Information received. The new application has been simplified in an attempt to more clearly convey the essence of the invention.

Item 4. Information received, see Item 1.

Item 5. The new application clarifies and reduces the number of terms used and is more consistent in term usage. This effort is also intended to avoid confusion with terms used by this and other inventors.

Item 6. This invention was not disclosed prior to the filing of the original patent application on February 5, 1996. The application process has been so drawn out because of negligence by my former patent attorney. (See file for Details.)

Item 7. It appears that the barrier issue is creating a confusion factor in regard to this invention. Accordingly, the claims are more focused on the formation of the controlled fracture. Subsequent injection of a fluid material into the fracture follows. That fluid solidifies and forms a layer of material that can be used for various purposes.

The key point of the invention is the method for creating a fracture in soil and the resulting fracture. All other soil fracture methods I have seen simply apply a pressure (stress) at a given point and accept the resulting soil fracture, which can vary widely because of the nature of soil. It is somewhat like cutting glass by applying stress without first scoring the glass, it can be done but the results are difficult to predict and cannot be controlled.

This invention uses a method to place stress concentrations cavities in soil that are spaced along the desired path of the fracture. The cavities are all oriented so that the initial path of the fracture is determined. The path can be at various depths and over a broad area. The method then applies a gaseous pressure to all stress concentration cavities at once, to cause the soil to initially fracture in a predetermine direction and location at each cavity, and causing all cavities to fracture at the same time. The resulting fracture at each cavity propagates with continued fracture fluid pressure and causes a lifting force on the soil above the fracture. Because of the plasticity and cohesiveness of most soils, the soil will lift as a single unit and the fractures around each stress concentration cavity will therefore connect to form a single and continuous fracture over a broad area. That is the fractures will connect through all stress concentration cavities and hence is therefore controlled. (The method of applying the stress is an extremely important point and is a critical element in the invention in order to take advantage of soil characteristics.)

Even if the method of Huff is used and wells are placed very close together (very expensive because of cost of drilling, handling and disposal of contaminated soil), there is no assurance that a single and continuous fracture will result. That is because the fractures are completed one at a time, not all together. Therefore the necessary mechanics of lifting the soil as a unit are not employed to produce a single fracture. Huff recognizes and illustrates the formation of individual fractures with each well (Fig's. 1, 2 and 3, items 12, 70,75 and 95). (The crossed hatched area of Fig's. 1, 2 and 3 are an assumed connection of the barrier fluid that may occur with the use of barrier fluids that penetrate and cause the soil to be "saturated" with the barrier material.) This is indicated when Huff notes "the fractures and surrounding strata are then saturated with a polymer or impermeable material" (col.2, line 36). In fact Huff further note that, "if the native permeability of the surrounding strata is sufficiently great, the need for fracturing may be reduced or entirely eliminated" (col. 5, line13). The fracture is simply a way of increasing the permeability of the soil where necessary. Because the fractures are not connected, Huff even uses guard wells to " minimize the effect of any gaps or leakage in the barrier" (column 5, line 53).

Either a Bingham or Newtonian type fluid can be used with the present invention to form a single and continuous barrier or layer of material. Even though a Bingham Type fluid will not seep into the soil, it will readily flow along the fracture plane and hence soil-penetrating fluids are not necessary. Conversely, a Bingham fluid cannot be used with the Huff method because it will not flow outside of the fracture. It is only with soil penetrating fluids (Newtonian fluids) that the fractures can be linked to form a barrier, and even that is not assured because soil may fracture only on one side of a well and not the other when using the Huff method. That is, there is little control over the fracture and no physical principle is used to cause the fractures to connect by the Huff method.

Again, I do not want the barrier issue to be a confusion factor. The uniqueness of this invention is the method of creating a single and continuous fracture in soil at a

predetermined and controlled location. The barrier is the principle application of the process and makes the invention practical. However other applications are possible.

Item 8 Information received. Hopefully, focusing on the fracture process rather than the barrier (as discussed above) will help clarify the essence of this invention